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CLAIMS

I Claim:

(S) 1. A low energy optical power limiter device for protecting thermal sensors against input threat laser radiation intended to disable the performance of said sensors in the far infrared spectrum, said limiter comprised of:

a multilayered optical power limiter device comprised of a plurality of optical power limiter layers of various thicknesses having progressively lower switching threshold temperatures and damage thresholds from an input radiation side to an output side of said device and further having high transmissivity below an energy threshold of incoming radiation, said plurality of optical power limiter layers positioned between an input window substrate layer having an input antireflection coating layer thereon and an output window substrate layer having an output antireflection coating layer thereon wherein the optical power limiter layer contiguous with said output window substrate layer has the lowest damage threshold and switching threshold temperature and is first switched on by said threat laser radiation to become reflective from the highly transmissive state in which said threat radiation is progressively reflected back through the remainder of said plurality of optical power limiter layers for a second pass of said threat laser radiation therethrough wherein the temperatures in each of said layers quickly build up by radiation absorption and switch on all of said plurality of optical power limiter layers essentially instantaneously to provide large optical density in the switched state at a low switching threshold representative of said optical power limiter layer contiguous with said output window wherein said plurality of optical power limiter

(S) layers has a high damage threshold representative of said optical power limiter layer contiguous with said input window substrate layer.

(S) 2. A device as set forth in Claim 1 wherein said plurality of optical power limiter layers is three in line from said input window substrate layer comprising a chalcogenide layer having a switching threshold temperature of 150° C, a germanium layer having a switching threshold temperature of 75° C, and a vanadium dioxide layer having a switching threshold temperature of 68° C wherein said vanadium dioxide layer absorbs said threat laser radiation which raises its temperature above 68° C and is self activated and switched on to change from transmissive to reflective and reflects subsequent threat laser radiation back to said germanium layer which absorbs both the subsequent incoming and reflected threat laser radiation which raises its temperature to 75° C and undergoes thermal runaway with the remainder of said reflected threat laser radiation absorbed by said chalcogenide layer which raises its temperature to 150° C resulting in all of said plurality of optical power limiter layers essentially switched on instantaneously wherein said device maintains the low switching threshold of said vanadium dioxide layer and wherein the optical power density is increased by the essential switching of all three optical power limiters instantaneously at the low switching threshold of said vanadium dioxide layer and wherein the damage threshold of said device is increased to that of said chalcogenide layer damage threshold since threat laser radiation is progressively and quickly reflected away from the lower damage thresholds of said vanadium dioxide layer and said germanium layer.

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(S) 3. A device as set forth in Claim 2 wherein said input and output window substrate layers are made of zinc selenide of about 1 millimeter thickness.

(S) 4. A device as set forth in Claim 3 wherein input and output antireflective coating layers are made of diamond-like carbon.

(S) 5. A device as set forth in Claim 4 wherein the thickness of each of said chalcogenide layer, said germanium layer, and said vanadium dioxide layer are chosen for desired transmission and thermal properties of each of said layers.

(S) 6. A device as set forth in Claim 5 wherein said chalcogenide layer is less than 50um, said germanium layer is less than 100um, and said vanadium dioxide layer is less than 5um.

(S) 7. A device as set forth in Claim 1 wherein a second optical power limiter layer of the same material as said layer having the lowest damage threshold and switching threshold temperature contiguous with said output window substrate is deposited between said input antireflective coating layer and said input window substrate layer, wherein said second of said lowest damage threshold and switching threshold temperature optical power limiter layers switches first upon self-activation thereof by input threat laser radiation and reflects said threat laser radiation from said device before it enters said input window substrate layer to protect said plurality of optical power limiter layers.